

## **REMARKS**

Favorable reconsideration and allowance of this application are requested.

### **1. Discussion of Amendments**

By way of the amendment instructions above, pending independent claims 1 and 16 have been further amended so as to clarify that the antioxidant and heat stabilizer are specific compounds as previously recited in claims 8 and 10. In addition, claims 1 and 16 have been amended so as to specify certain compounds defining the processing stabilizer, namely a long-chain fatty acid ester, a long-chain fatty acid amide and/or a polyoxyalkylene glycol, based on prior claim 8 and paragraphs [0048] and [0049] and the Examples. Claims 8-10 have thus been canceled as redundant.

The phrase "mono- or trihydrazide" has also been amended in claims 1 and 16 to the phrase "mono- to trihydrazide" so as to conform the same with similar expressions therein.

Claim 6 has been revised so as to delete the term "a processing stabilizer" and thus address the objection helpfully noted by the Examiner.

Accordingly, following entry of this amendment, claims 1, 4-7 and 11-19 will remain pending herein for consideration for which favorable reconsideration on the merits is solicited.

### **2. Response to Art-Based Rejections**

Prior claims 1 and 4-19 attracted a rejection under 35 USC §102(b) as allegedly anticipated by Harashina (WO 01/05888, using USP 6,753,363 as English translation). In addition, claims 1, 4-6 and 16-19 attracted a rejection under 35 USC §103(a) as allegedly "obvious" and hence unpatentable over Mori et al (US 2003/0055143) in view of Sheppard et al (USP 6,518,339).



As will become evident from the following discussion none of the applied references is inappropriate as an anticipatory reference against the presently pending claims.

**A. The Applied References**

**(i) Harashina (WO 01/0588)**

As was previously noted in the applicants' Amendment dated September 24, 2008, Harashina discloses a polyacetal resin composition which comprises a polyacetal resin, a hindered phenol-series compound, a weather (light)-resistant stabilizer, and a spiro-compound having a triazine ring. (See claim 1)

The composition may further comprise at least one member selected from a processing stabilizer and a heat stabilizer (see claim 20). The heat stabilizer includes (a) a basic nitrogen-containing compound, (b) a phosphine compound, (c) a metal salt of an organic carboxylic acid, (d) an alkaline or alkaline earth metal compound, (e) hydrotalcite, and (f) zeolite (column 12, lines 14-18).

The basic nitrogen-containing compound of Harashina et al may include an aliphatic amine (such as monoethanolamine, diethanolamine, etc.), an aromatic amine (e.g., an aromatic secondary or tertiary amine such as o-toluidine, p-toluidine, p-phenylenediamine, etc.), an amide compound (a polycarboxylic acid amide, e.g., malonamide, isophthaldiamide, and the like, p-aminobenzamide, etc.), a hydrazine or a derivative thereof (e.g., a hydrazine, a hydrazonen, and a hydrazide such as a polycarboxylic acid hydrazide, etc.). (column 12, lines 14-32)

Regarding the effects of the invention, Harashina discloses that:

“[The compositions] can be improved in weather (light)-resistant stability, particularly, greatly improved in degradation (or aging) caused by



light after molding. Moreover, addition of a small amount of the above-mentioned components enables to suppress or inhibit formaldehyde emission from the polyacetal resin and an article thereof at extremely low level, and enables to improve excellently the circumferential environment (e.g., working environment and using environment). Furthermore, the polyacetal resin composition of the present invention can be (sic) inhibit emission of formaldehyde even under severe conditions to suppress: deposition of decomposition products on the mold (mold deposit); blooming or bleeding of such products from a shaped article; and thermal aging or deterioration of the article thus contributing, to upgrading of the quality and moldability of the shaped article.” (Column 18, lines 36-52.)

**(ii) Mori et al (US 2003/0055143)**

Mori et al disclose a composition of matter comprising an admixture of a polyacetal resin and a fragrance material that is, in its chemical structure, free of aldehyde groups (claim 1).

Moreover, the resin composition of Mori et al preferably contains a formaldehyde scavenger (paragraph [0054]), with adipic acid hydrazide being exemplified together with other compounds as the scavenger (paragraph [0055]. In this regard, Mori discloses the following with respect to the acid scavenger:

“The resin composition of the invention preferably also contains a formaldehyde scavenger in order to reduce the concentration of formaldehyde gas released from the polyacetal resin. Including a formaldehyde scavenger in the resin composition enables the concentration of formaldehyde released from the shaped article to be reduced to not more than 25 ppm at normal temperature” (paragraph [0054])



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"Illustrative examples include aminoethyl alcohol,... p-aminobenzoic acid, methyl p-aminobenzoate, ...o-aminobenzoic acid amide, adipic acid hydrazide, hydantoin, and hydantoin-5-ureido." (paragraph [0055]).

Regarding other additives, Mori et al also disclose that:

"If necessary, other additives commonly used in polyacetal resins, such as heat stabilizers, antioxidants, plasticizers, lubricants, fillers and colorants may be added to the ... resin composition." (paragraph [0057]).

Mori et al disclose that the polyacetal resin composition is suitable for use in the production of shaped articles for a variety of uses, but is especially well-suited to the production of slide fasteners (paragraph [0063]).

With regard to the effects of the Mori et al compositions, it is noted that the further addition of a formaldehyde scavenger enables the production of shaped articles which have even better aromaticity and better suppresses the release of formaldehyde (paragraph [0025]).

**(iii) Sheppard et al (USP 6,518,339)**

Sheppard et al disclose a polyolefin composition comprising a dibenzylidene sorbitol compound having a specific chemical structure and an additive that reacts with free aldehydes present within a polyolefin matrix in order to reduce the release of such free aldehydes from said polyolefin composition. The additive is said to include at least one hydrazide selected from the group consisting of adipic, pimelic, suberic, glutaric sebacic, eicosanedioic dihydrazide, and any mixtures thereof." (claim 1).



Regarding the hydrazide compounds, Sheppard et al disclose that:

"It is believed that certain hydrazide compounds form a water insoluble reaction product with aldehydes within polypropylene products, thereby eliminating or significantly reducing the levels of aldehydes released from the plastic. Both hydrazides and hydrazines are known to react readily with aldehydes to form hydrazones." (column 3, lines 10-15).

Regarding the effects of the composition, Sheppard et al disclose that:

"Hydrazides have been shown to be effective at removing residual aldehyde from polyolefins, such as polypropylene. This function can be accomplished with a minimal impact on optical transparent properties imparted to the polypropylene by the clarifying agent. The net effect is an improvement in the organoleptic performance of resins containing clarifiers, and a reduction in the UV-absorbing extractable. Particularly, adipic dihydrazide, when co-compounded into polypropylene homopolymer with 4-methyl DES, improves the organoleptic performance of the clarifier. Incorporation of dihydrazides into polypropylene pellets reduced air-released aldehyde by nearly 100%." (column 6, lines 58-67).

#### **B. Patentability of Claimed Invention over Applied References**

One of the features of the present invention that should not be overlooked when reviewing its patentability resides in the *specific* combination of a *specific* antioxidant, a *specific* heat stabilizer and a *specific* processing stabilizer in connection with a polyacetal resin and a specific carboxylic acid hydrazide. None of the applied



references disclose or suggest such a specific combination. As such, the present invention is clearly novel and patentably unobvious in light of the applied references.

In particular, none of the cited references provide any information about either the specific processing stabilizer or the combination of such a specific processing stabilizer with other components. Therefore, the specific combination of components as defined in the presently pending claims would never be predicted from the applied references of record.

Furthermore, the present invention also shows unexpected results. That is, since Harashina and Mori et al only exemplify an antioxidant and a heat stabilizer as additives, the relationship of the following attributes (a1), (a2) and (a3) would never be derived from such references in connection with other additives exemplified therein:

- (a1) improvements in heat stability,
- (a2) suppression of mold deposits and bleed-out properties, and
- (a3) suppression of formaldehyde emissions.

In particular, it would not be predicted from the applied references that some additives influence different characteristics compatible with each other. For example, it would never be predicted from the cited references whether or not the Inhibition effect in formaldehyde emission is compatible with other properties such as heat stability, and inhibition of mold deposits and bleed-out of an additive(s).

In contrast, according to the presently claimed invention, mold deposits and bleed-out of additives and the like from the composition are remarkably suppressed while effectively also inhibiting formaldehyde emissions under both of dry and humid conditions. These remarkable effects are achieved by the claimed specific combination of components which thereby improve moldability or molding efficiency.



The Examiner's attention is invited to the comparison of Example 1 with the Examples 2-7 in Table 1 of the present specification. As such a comparison shows, the composition of Example 1 (which does not comprise an antioxidant, a heat stabilizer and a processing stabilizer in combination) exhibits an inhibited formaldehyde emission property to some degree. However, the mold deposit and bleed out of additives from such composition is not sufficiently inhibited relative to other Examples. On the other hand, other Examples (i.e., Examples 2-15) demonstrate that that mold deposit and bleed-out properties are suppressed and are moreover compatible with an inhibited formaldehyde emission, even though the contents of the hydrazide are **less** than that of Example 1.

Thus, such unexpected results of the present invention could never be predicted from the applied references of record. Withdrawal of the rejections advanced under 35 USC § §102(b) and 103(a) based on such references is therefore in order.



**HARASHINA**  
**Serial No. 10/574,012**  
April 3, 2009

### **3. Fee Authorization**

The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140.

Respectfully submitted,

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